Mathematics for Political Science

Political Science W4360

Fall 2008

MW 9:10-10:25

John Huber

714 International Affairs Building

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Office hours: Wednesdays, 10:45-12 and by appointment.

TA for course: Bernd Beber, bhb2102@columbia.edu.

This course introduces students to the basic mathematical tools frequently used in political science, as well as to basic approaches to mathematical proof. The course, or knowledge of the math taught in the course, is a prerequisite for the advanced statistics (e.g., Pols 4912) and formal modeling courses (e.g., Pols 4210). Students are assumed to remember basic high school algebra. Those who do not will be given assistance early in the semester to "come up to speed." No prior knowledge of calculus is necessary.

Texts

The text for the course is Kevin Wainwright and Alpha C Chiang, *Fundamental Methods of Mathematical Economics*. It should be purchased ASAP at Labyrinth Books on 112th St (between Broadway and Amsterdam) and can be ordered from Barnes and Noble on-line (same or next-day delivery in NYC for free!)

Requirements

Homework assignments (35 percent). Students may collaborate on homeworks, but must write up the answers individually.

In-class exams (65 percent). There will be two major exams (midterm and final) and (if needed) a series of "minor" exams that will test skills learned in the homeworks.

This is a “lecture-driven” course. The book is intended to reinforce what goes on in class. Students will not be expected to know material that is covered in the text and not covered in lectures, unless I specifically assign such material.

Topics

1. Set Theory

   Notation; Methods of Proof; Basic Set Theory; Open and Closed Sets; Ordered Pairs; Functions and Correspondences; Sequences and Limits.

2. Differential Calculus

   Continuity; Differentiability; First, Second and nth order Derivatives.

3. Linear Algebra

   Vectors and Vector Spaces; Matrices; Matrix Operations; Inverses of Matrices; Solutions to Systems of Linear Equations.

4. Optimization and Integration

   First and Second Order Conditions; Necessary and Sufficient Conditions for Global Maxima; Integration; Constrained Maximization, Non-linear programming (Kuhn-Tucker)

5. Probability theory (time permitting)